

WHAT IS CLAIMED IS:

1. A wavelength-division-multiplexed passive optical network comprising:
 - a central office in which a multi-wavelength lasing source is located;
 - 5 a plurality of subscriber terminals for transmitting an upward signal using a reflected signal of a multi-wavelength signal transmitted from the central office; and
 - a local office disposed between the central office and the subscriber terminals via optical fibers for demultiplexing the multi-wavelength signal transmitted from the central office and for multiplexing signals from each of the subscriber terminals.
- 10 2. A wavelength-division-multiplexed passive optical network as claimed in claim 1, wherein the central office comprises:
 - a first optical amplifier for generating amplified spontaneous emission noise;
 - a multiplexing/demultiplexing device having a first input/output terminal and a
 - 15 plurality of upward signal output terminals at a first side portion so as to receive the amplified spontaneous emission noise and to output a multi-wavelength lasing light, and a plurality of second input/output terminals and an upward signal input terminal for a multi-wavelength lasing light generation at the first side portion so as to output a multi-wavelength lasing light multiplexed in response to the input of the amplified spontaneous
 - 20 emission noise and to demultiplex and to output the upward signal in response to the input of the upward signal;
 - a plurality of upward signal receivers coupled to the upward signal output

terminals at the first side portion of the multiplexing/demultiplexing device in one-to-one correspondence;

a plurality of reflection means coupled in one-to-one correspondence to the second input/output terminals at the first side portion of the multiplexing/demultiplexing device, so

5 as to input demultiplexed signals outputted through the second input/output terminals back to the second input/output terminals; and

a circulator for outputting a multi-wavelength lasing light inputted from the multiplexing/demultiplexing device to the local office and transmitting an upward signal inputted from the local office to the upward signal input terminal of the 10 multiplexing/demultiplexing device.

3. A wavelength-division-multiplexed passive optical network as claimed in claim 2, wherein the multiplexing/demultiplexing device is an $N \times N$ waveguide grating router.

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4. A wavelength-division-multiplexed passive optical network as claimed in claim 2, wherein the plurality of reflection means are mirrors.

5. A wavelength-division-multiplexed passive optical network as claimed in 20 claim 2, wherein the central office further comprises an external modulator for modulating a multi-wavelength lasing light outputted from the multiplexing/demultiplexing device on the basis of predetermined broadcasting service signals and for outputting the modulated

signal to the circulator.

6. A wavelength-division-multiplexed passive optical network as claimed in claim 5, wherein the external modulator is a LiNbO₃ modulator.

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7. A wavelength-division-multiplexed passive optical network as claimed in claim 5, wherein the external modulator is an electro-absorption modulator.

8. A wavelength-division-multiplexed passive optical network as claimed in
10 claim 5, wherein the external modulator is a semiconductor optical amplifier.

9. A wavelength-division-multiplexed passive optical network as claimed in claim 1, wherein the subscriber terminal includes a reflective optical amplification means.

15 10. A wavelength-division-multiplexed passive optical network as claimed in claim 9, wherein the reflective optical amplification means is a reflective semiconductor optical amplifier.

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11. A wavelength-division-multiplexed passive optical network as claimed in
claim 10, wherein the reflective semiconductor optical amplifier comprises an anti-
reflection coating face formed on one side, a high-reflection coating face formed on another
side, and a gain medium formed between the anti-reflection coating face and the high-
5 reflection coating face, so that the semiconductor optical amplifier total-reflects a signal
inputted through the anti-reflection coating face by the high-reflection coating face and
outputs the total-reflected signal.

12. A wavelength-division-multiplexed passive optical network as claimed in
10 claim 11, wherein the semiconductor optical amplifier further amplifies and modulates the
signal when the signal passes the gain medium.

13. A wavelength-division-multiplexed passive optical network as claimed in
claim 9, wherein the subscriber terminal further comprises an optical distributor and a
15 broadcasting data optical receiver so as to receive a broadcasting service signal, the optical
distributor distributing downward signals inputted from the local office to the reflective
optical amplification means and the broadcasting data optical receiver.